4. The method of claim 1, wherein said electrical characteristic is at least one selected from the group consisting of: current, voltage, capacitance, conductance, resistance, and impedance.

5. The method of claim 1, wherein the step of detecting includes coupling said molecular layer, said cantilever, and a meter to each other in a circuit.

6. The method of claim 1, wherein the molecular layer is at least one selected from the group consisting of: a self-assembled monolayer, a thin insulator layer deposited on a substrate, a self-assembled multilayer, a Langmuir-Blodgett film, and a supramolecular structure.

7. The method of claim 1, wherein said molecular layer is assembled by at least one technique selected from the group consisting of: ion beam sputtering, ion beam deposition, evaporation, sputtering, physical vapor deposition, chemical vapor deposition, and electrodeposition.

8. A system for measuring an electrical characteristic on a molecular scale, said system comprising:

a molecular layer, subject to having said electrical characteristic thereof measured;

an atomic force microscope (AFM) including a cantilever having a large contact area probe tip for probing said molecular layer; and

a meter coupled to said molecular layer and said cantilever for detecting said electrical characteristic of said molecular layer in response to said probing of said molecular layer.